NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

WATERSPREADING

(ac.)
CODE 640

DEFINITION

A system of dams, dikes, ditches, or other means of diverting or collecting runoff from natural channels, gullies, or streams and spreading it over relatively flat areas.

PURPOSE

Supplement natural precipitation in areas where plants can effectively use additional moisture.

CONDITIONS WHERE PRACTICE APPLIES

Waterspreading differs from irrigation in that applications are timed by the availability of natural runoff flow rather than scheduled to meet plant needs. This standard does not apply to Conservation Practice Standard – Irrigation System, Surface and Subsurface (443).

Although applicable to any climatic condition, areas with an average annual precipitation of 8 to 25 inches show the greatest benefit from waterspreading.

Waterspreading systems apply to areas where:

Local, state, and federal laws and regulations will permit development;

Soils have suitable intake rates and adequate water-holding capacities for the type of system and crops to be grown;

Topography is suitable for water diversion or collection and the benefited area allows uniform spreading of water to achieve the desired result;

A system can be installed that allows economical production of feed, forage, or grain crops;

Climatic conditions indicate the additional moisture will improve plant growth;

Suitable quality runoff and stream flow are available in sufficient volume at the time of year needed to increase plant growth;

Fish, wildlife, and cultural resources will not be adversely affected;

Flows can be collected or diverted and spread and excess water returned without causing excessive erosion;

Grazing of the spreading area can be controlled.

CRITERIA

Laws and Regulations. This practice must conform to all federal, state, and local laws and regulations. Laws and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Drainage area. For dependable results, runoff must be available to provide the design water application an average of 8 years in 10.

To be economical, systems using less dependable runoff must be less expensive and must provide the design water application at least one year out of two.

Diversion works. On watercourses with less than 24-hour expected flow duration, diversion works should be automatic, requiring no manual control to divert water into the conveyance system or onto the spreading areas.

The waterspreading system must be capable of safely conveying design peak flows through the system or bypassing them at the diversion. Normally, diversion controls should operate so only the desired rate of flow enters the conveyance system.

Where flood flow sediment will reduce the life of the system or damage soil characteristics, a low-flow bypass must be installed to exclude bedload from the system.

Inlet control(s) must exclude flow from spreading areas at undesirable times, such as when crops are harvested. Diverted flows must not cause undue maintenance problems.

Conveyance system. The conveyance system shall have the capacity to safely convey the design flow from the diversion works to the spreading area.

Spreading area. Ditches, dikes, diversions, conduits, and similar structures will be arranged and located to spread diffused flow over the land surface or to pond water over the land. All slopes will be stable and graded to the slope necessary for management and harvesting operations. Land leveling, land forming, land smoothing, obstruction removal, and similar practices may be performed for more uniform distribution of water and increased operation efficiency. Every component practice, installed as part of the overall system, will comply with the Natural Resources Conservation Service (NRCS) standard for that practice.

If water is to be spread over the area as diffused flow, the depth of application should be the approximate depth of water that the soil will absorb in the period equal to the estimated flow duration. For soils that have rapid or very rapid permeability, this depth may be more than is needed to fill that root zone.

If water is to be impounded on the spreading area, the depth of application should approximate the available moisture holding capacity of the soil profile for the effective root zone of the plants to be grown. Rapidly permeable soils are generally unsatisfactory for impoundment systems. The system should be designed and managed to minimize deep percolation.

Outlet works. A provision must be made for returning excess water from the system to the stream channel or other parts of the system without causing excessive erosion and in time to prevent crop damage by ponded water. The flow line of the structure used for this purpose should be below ground level to improve flow characteristics.

Additional Criteria Applicable To Detention-Type Waterspreading Systems

Topography. Detention type systems are ideally suited to uniform, gently sloping land. Provide effective drainage for each basin.

Water impounding dike. Embankments impounding water depth greater than 5 feet must be designed following Conservation Practice Standard Pond (378).

The maximum depth of water impounded against dikes will be 3 feet except across channels, sloughs, swales, or gullies less than 40 feet wide, where up to 5 feet of depth will be allowed.

Minimum top width of dikes at design top elevation will be three feet. Freeboard from design water surface to dike top shall be 1.0 foot or the wave height from wind and fetch length calculations, whichever is greater (see Outlet works section for added criteria).

Side slopes of dikes will not be steeper than two horizontal to one vertical (2:1). They should be flatter as needed for stability and 4:1 or flatter for safe mowing or other machinery operations.

Outlet works. Dikes with a total water storage capacity less than the 10-year, 24-hour runoff volume from the contributing area must have at least one outlet or overflow section that is at least 1.0 ft below dike design top elevation. This may be a vegetated spillway, stable rock, weir overflow structure, pipe outlet, or combination.

The minimum outlet design flow rate is (1) the maximum diverted rate of flow or (2) the 10-year 24-hour peak flow from the contributing area, whichever is less. Total capacity of the outlet must exceed the routed design inflow to the impoundment.

Vegetative Cover. All areas where vegetation has been disturbed during construction should be seeded following completion of construction. Seedbed preparation, seeding, sodding, fertilizing, and/or mulching shall comply with applicable NRCS technical standards.

CONSIDERATIONS

When planning this practice, consider:

Other practices needed such as brush removal, fencing, and seeding.

Crops to be grown. Potential benefits are highest with forage, hay or seed crops having maximum effective rooting depth.

Control erosion. Include erosion control at the diversion works, within the spreading area, and at the outlet facilities.

Effects of livestock use of the spreading areas. Manage livestock to prevent compaction when soils are wet and to prevent range degradation by overuse.

Climate. Northern and mountainous regions receive a large percentage of annual runoff from

snowmelt. Volumes, quality, and conditions during snowmelt become important to system design. Typically, a detention type system should be used if snowmelt runoff is diverted, to prevent erosion and promote infiltration.

Detention area slopes. Slopes greater than two percent should generally be avoided. Cost escalates rapidly as slope increases. Effective basin slope may be flattened by taking borrow along top of each basin (immediately below next dike above).

The reduction of downstream surface water quantity, and effects on potential users. Evaluate both the volume of water diverted and volume of return flows.

Effects of increased soil moisture and ground water quantity on the waterspreading areas.

Sediment, pathogens, adsorbed and dissolved nutrients and pesticides, and soluble chemicals infiltrating in the waterspreading areas.

Potential chemical degradation of return flows leaving the waterspreading areas. Consider rate and volume of return flows, chemicals used, time of chemical application in comparison to predictable storm events, and the nature of sediments transported.

Potential ground water degradation from applied chemicals caused by increased infiltration. Important factors include available soil moisture storage, evapotranspiration, type and amounts of chemicals used and saline geology.

PLANS AND SPECIFICATIONS

Plans and specifications for waterspreading shall meet this standard and shall describe the requirements needed to achieve the purpose.

OPERATION AND MAINTENANCE

An Operation and Maintenance Plan shall be developed for use by the owner/operator. Minimum requirements to be addressed are:

Specific instructions and operational requirements to safely divert the desired volume of water into the system, store as applicable, and release return flows.

Average water yields by event, times to fill and empty the system, and any other hydrologic and hydraulic information needed to operate the system as designed.

Soil infiltration and water-holding capacities, anticipated crops to be grown, effects of inundation, and any other information that will assist the operator in making sound economic and environmental decisions.

Inspection and repair, or replacement of components as necessary.

Removal of debris and foreign material from structures, ditches, and other components that might hinder operation.

Maintenance of good vegetative cover on all slopes and watercourses.